

WHAT IS CLAIMED IS:

1 1. A local area network for distributing data communication,
2 sensing, and control signals, the local area network comprising at least three
3 nodes having an operational mode and interconnected by at least two distinct
4 communication links according to a topology, wherein:

- 5 (a) each of said communication links has at least two electrical
6 conductors;
7 (b) each of said communication links connects two of said nodes in a
8 point-to-point configuration;
9 (c) each of said communication links is operative for communicating
10 in a half-duplex mode;
11 (d) at least one of said nodes is connected to a payload;
12 (e) at least two of said nodes have said operational mode selectable
13 as a data-generating operational mode;
14 (f) at least one of said nodes has said operational mode selectable as
15 a repeating operational mode;

16 and wherein the local area network has a state selectable from a group of
17 at least two distinct states, wherein each state is characterized by having a
18 single selected one of said nodes in the data-generating operational mode, with
19 a remainder of said nodes in operational modes selected from a group
20 containing the receiving operational mode and the repeating operational mode.

1 2. The local area network as in claim 1 wherein said topology is a
2 linear topology.

1 3. The local area network as in claim 1, wherein said topology is a
2 circular topology.

1 4. The local area network as in claim 1, furthermore comprising at
2 least one source of electrical power distributed via said communication links.

1 5. The local area network as in claim 4, wherein said electrical
2 conductors are operative to distributing both said electrical power and the data
3 communication, sensing, and control signals.

1 6. The local area network as in claim 1, furthermore comprising a
2 network controller for selecting said operational modes of said nodes.

1 7. The local area network as in claim 6, wherein said network
2 controller is operative to selecting said operational modes of said nodes via
3 signals transported by the local area network.

1 8. The local area network as in claim 1, wherein said node in said
2 data-generating operational mode is selected sequentially.

1 9. The local area network as in claim 1, wherein at least one of said
2 communication links is operative to communicating in the full-duplex mode.

1 10. A node for distributing data communication, sensing, and control
2 signals in a local area network, the node comprising:

- 3 (a) a first line coupler, connected to a first communication link;
- 4 (b) a second line coupler, connected to a second communication link;
- 5 (c) a power supply having a source of electrical power;
- 6 (d) a control, logic, and processing unit;
- 7 (e) a repeater/router, connected from said first line coupler to said
8 second line coupler;

9 11. wherein said repeater/router has a state selected by said control,
10 logic, and processing unit from a group containing a state wherein said first line
11 coupler repeats data to said second line coupler, and a state wherein said
12 second line coupler repeats data to said first line coupler.

1 12. The node as in claim 10, further comprising at least one receiver
2 connected to said repeater/router.

1 13. The node as in claim 11, wherein said group furthermore contains
2 a receive-only state.

1 14. The node as in claim 10, further comprising at least one
2 transmitter connected to said repeater/router.

1 15. The node as in claim 13, wherein said group furthermore contains
2 a transmit-only state.

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1 17. The node as in claim 15, wherein said payload interface is
2 connected to a device selected from a group containing sensors, actuators, and
3 data terminal equipment.

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